easyRAID S8
Hardware User Manual

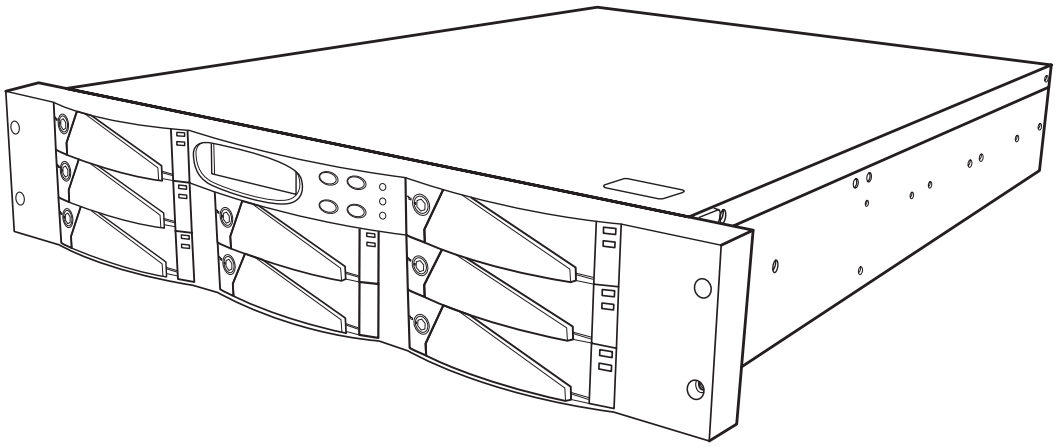
Ultra 320 SCSI to Serial ATA

&

Fibre Channel to Serial ATA

Disk Array Systems

Version 1.1



easyRAID S8-U4R2

Ultra 320 SCSI to Serial ATA

Disk Array System

&

easyRAID S8-F2R2

Fibre Channel to Serial ATA

Disk Array System

Hardware User Manual

Preface

About this Manual

This manual is designed to make the disk array system as easy to use as possible. Information contained in this document has been checked for accuracy, but no guarantee is given that the contents are correct. Information and specifications are subject to change without notice.

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Conventions

Caution

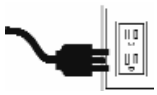
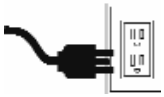
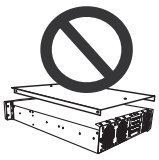
This symbol is used to remind users to pay attention to important descriptions regarding usage and maintenance (repair) or additional important information related to this disk array system.

Note

This symbol is used to remind users of useful information that can make procedures such as configuration easier to accomplish.

Important Safety Instructions, Care and Handling

	Before starting, take a few minutes to read this manual. Read all of these instructions and save this manual for later reference.
	Protect the disk array system from extremely high or low temperatures. Let the disk array system warm (or cool) to room temperature before using it.
	Protect the disk array system from being bumped or dropped. Do not place the disk array system on an unstable cart, stand, or table. It may fall, causing serious damage to the product.
	Keep the disk array system away from magnetic forces.
	Do not use the disk array system near water.
	Keep the disk array system away from dust, sand, or dirt.
	Gaps and openings in the cabinet are provided for ventilation. Never block or cover these openings, because the disk array system may overheat and become unreliable. Don't place the disk array system on a bed, sofa, rug, or other similar surface.
	Do not place the disk array system near or over a radiator or heat register.
	Refer to the rating plate for the correct voltage and ensure that the appliance voltage corresponds to the supply voltage.

	The appliance must be grounded. The disk array system is equipped with a 3-wire grounded type of power cord. This power cord will only fit into a grounded type of power outlet.
	If an extension cord or a power center is used with the disk array system, make sure that the total current consumption of all products plugged into the wall outlet does not exceed the ampere rating.
	Do not place the disk array system where the cord will be walked on.
	Never push any kind of object into the disk array system through cabinet gaps and openings, since they may touch dangerous voltage points and cause a risk of fire or electric shock.
	Unplug the power cord from the wall outlet before cleaning. Keep the disk array system dry. Do not use liquid cleaners, aerosol cleaners, or a wet cloth. Use a damp cloth for cleaning.
	Except as specifically explained in this User Manual, do not attempt to service the disk array system by yourself. Opening or removing the covers may expose you to dangerous voltages.
	Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions. • If the disk array system has been exposed to water or any liquid. • If the disk array system has been dropped or the cabinet damaged.
	User should not remove the cover.

Placement Notes

- The disk array system LCD panel can be damaged by exposure to direct sunlight. Limit exposure to subdued or indirect sunlight only.
- The disk array system should be used only in clean environments that are free from airborne contaminants such as dust, dirt, and smoke. Excessive moisture or oil particles in the air can also hinder disk array system performance.
- To reduce the possibility of data errors caused by electromagnetic interference, locate the disk array system at least five feet away from electrical appliances and equipment that generates magnetic fields.

Power Supply Safety Notes

- To avoid electric shocks, do not use an extended power cord or an outlet that does not match the disk array system plug or leaves the plug exposed.
- The disk array system has a 3-wire grounded plug. The third pin connects to ground; do not remove it.
- If the power cord or plug is damaged or worn, unplug it immediately and contact a qualified service technician for maintenance.
- To avoid fire or electric shocks, do not overload electric power outlets.

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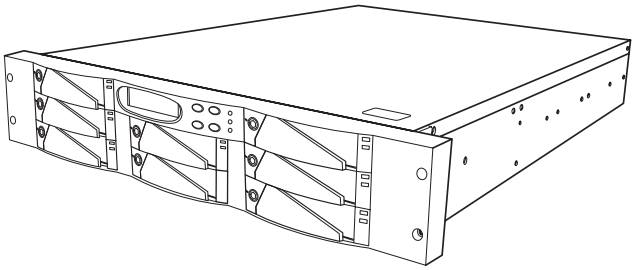
1 Overview



The disk array system uses groups of inexpensive disks to provide flexibility when balancing data availability, access rate, and capacity management needs.

High data availability is achieved by using the fault tolerance features of RAID (Redundant Array of Inexpensive Disks); hot spare disks with automatic on-line rebuild; hot swap disks, and power supplies; independent ATA disk controllers; and dual host controllers. Our confidence in the disk array system is backed by a three year warranty.

A high data access rate is achieved by combining the individual data rates of ATA disks in a RAID configuration. ATA disks lack some of the features of SCSI disks but are just as fast when used with a high performance RAID controller. In the disk array system, RAID is controlled by a high performance CPU, which transfers data through dual host interfaces at the maximum possible rate.

Flexible data capacity management is achieved with on-line RAID expansion, RAID capacity division into slices, and multiple logical RAIDs. Management is performed through front panel or RS-232 interfaces.

Features

The main features of the disk array system are listed as follows. Refer to the specifications table on page 29 for more detailed information.

- Operating system independent
- Up to eight JBOD, RAID 0, 1, 3, 5, 0+1, 30, or 50 array groups
- On-line expansion and RAID level migration
- Allows division of array groups into slices, each mapped to a LUN
- Hot spare disk and automatic on-line rebuild
- Up to 8 hot swap ATA disks on independent channels for up to 2 TB (terabytes) capacity
- Two hot swap power supplies – if one fails, the others take over without interruption
- Fast 64-bit RISC CPU based RAID controller with up to 1 GB of cache in an SO-DIMM
- Dual Ultra SCSI (easyRAID S8-U4R2) or fibre channel (easyRAID S8-F2R2) host interfaces
- Audible alarm, disk tray LED, and LCD panel failure indicators
- Configuration via the front panel or RS-232 interfaces
- Real-time clock

Understanding RAID

Read this section to understand how to balance data availability, access rate, and capacity management needs.

Just a Bunch Of Disks

Just a Bunch Of Disks (JBOD) consists of two or more disks that can be different sizes. Disk 1 is completely filled, then disk 2, disk 3, and so on until the final disk is full.

The total capacity of JBOD is the sum of the capacities of each disk. Disks are added until the desired total capacity is reached.

JBOD is used in the following situations:

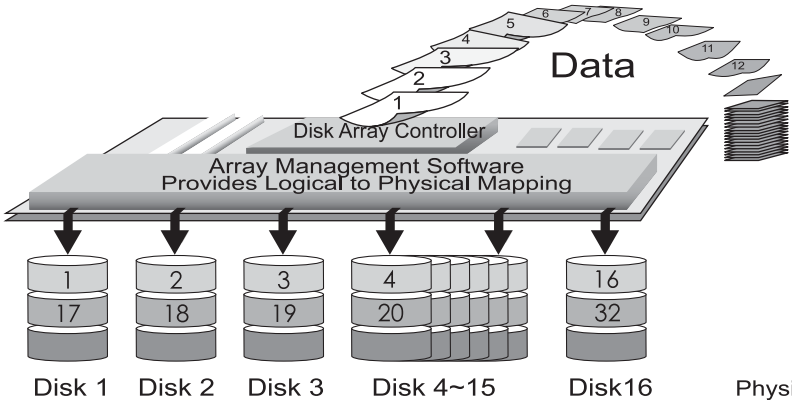
- Building useful capacity from disks that are too small to be individually useful
- Making capacity management easier, since the user only sees one logical disk

JBOD doesn't improve data availability or access rate when compared with a single disk.

RAID Levels

The overall arrangement of disks in RAID is called the RAID level. Read this section to understand RAID levels.

RAID 0



In RAID 0, data is divided into pieces and written to all disks in parallel. This process is called striping because the pieces of data form a stripe across multiple disks. This improves access rate, but makes availability lower, since there are more disks and failure of a single disk causes failure of the array. A RAID 0 array is unsuitable for data that can not easily be reproduced, or for data that must be available for critical system operation.

RAID 0 consists of two or more disks of equal capacity. The total capacity of RAID 0 is the sum of the capacities of each disk. Disks are added until the desired total capacity is reached.

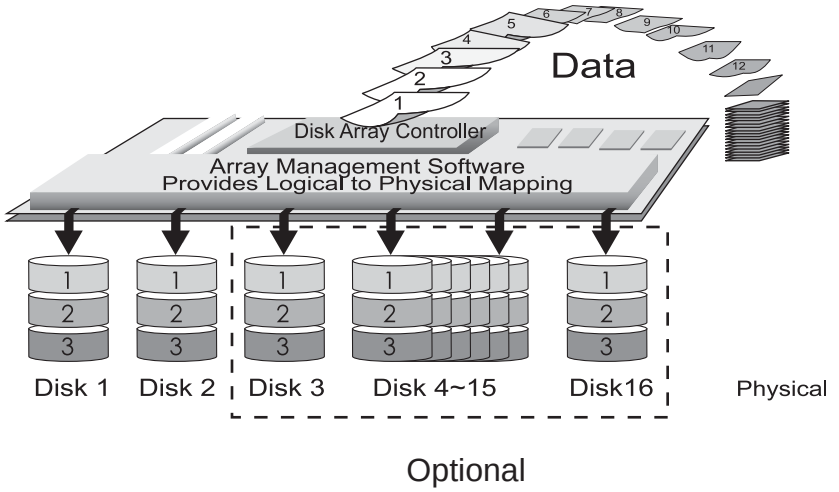
A RAID 0 array is useful in the following situations:

- Storing program image libraries or run-time libraries for rapid loading. A backup exists because these libraries are usually supplied on read-only media.
- Storing large tables or other structures of read-only data for rapid application access. This data should be backed up so that it can be recreated in the event of a failure.
- Capturing data from external sources at very high data transfer rates.

A RAID 0 array is not useful in the following situations:

- Applications that make sequential requests for small amounts of data. These applications spend most of their I/O time waiting for disks to spin, whether or not they use striped arrays.
- Applications that make synchronous random requests for small amounts of data.

RAID 1

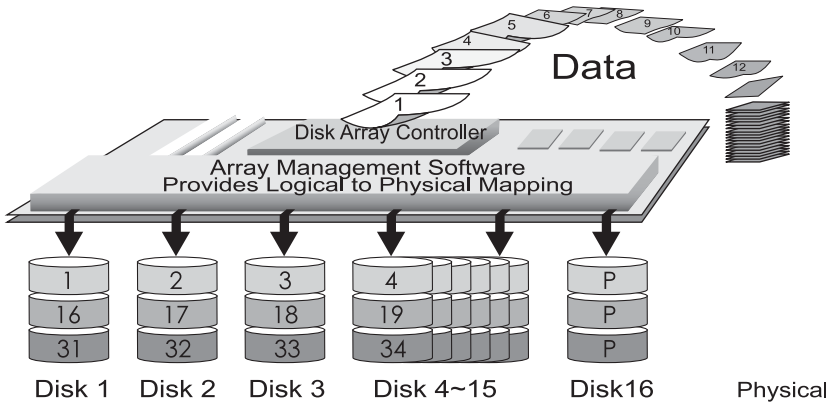


In RAID 1, data is duplicated on two or more disks to provide high access rate and very high data availability. This process is called mirroring. If a disk fails, the RAID controller directs all requests to the surviving members.

A RAID 1 array is useful in the following situations:

- Availability requirements are very high
- High access rate is required
- Cost of storage is a secondary issue

RAID 3



In RAID 3, data is divided into pieces; the parity of these pieces is calculated; and the pieces are written to separate disks in parallel with the writing of the parity to a dedicated disk. This process is called striping with parity. The parity disk stores redundant information about the data on other disks. If a single disk fails, then the data on the other disks is used to regenerate the data on the failed disk. Striping delivers a high access rate and parity delivers good data availability. The single parity disk is a bottleneck on sequential writes, since parity must always be written to the single parity disk.

RAID 3 consists of two or more disks used for data and one disk used for fault tolerant data. The total capacity of RAID 3 is the sum of the capacities of each data disk. Add disks until the desired capacity is reached, then add one more disk for fault tolerance.

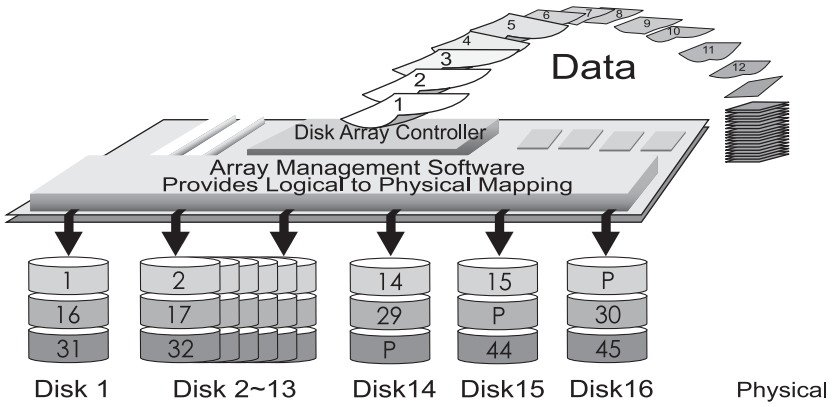
RAID 3 is used by the following applications that request large amounts of data sequentially:

- Processing of graphical or video images
- Processing of CAD/CAM files

RAID 3 has the following distinctive features:

- Excellent performance for data transfer characteristics
- Not well suited for transaction processing or other I/O request intensive applications

RAID 5



In RAID 5, data is divided into pieces; the parity of these pieces is calculated; and the pieces and parity are written to separate disks in parallel. The parity is written to a different disk each time. Parity provides redundant information about the data on other disks. If a single disk fails, then the data on the other disks is used to regenerate the data on the failed disk. Striping delivers a high access rate and parity delivers good data availability. The bottleneck caused by the single parity disk of RAID 3 is not present in RAID 5, since parity is stored on all disks.

RAID 5 consists of two or more disks used for data and one additional disk used for fault tolerence. The total capacity of RAID 5 is the sum of the capacities of each data disk. Add disks until the desired capacity is reached, then add one more disk for fault tolerance.

RAID 5 is best used with applications whose data has the following characteristics:

- The data is worth protecting, but not as much as RAID 1
- High read data rates
- Small proportion of writes to reads

NRAID

NRAID (Non-RAID) is an array that concatenates the space of all hard disks linearly and forms a large logical disk. The space presented by the NRAID array starts sequentially from the space of the first member disk to the last member disk without striping, mirroring, or parity.

Hot Spare Disks

A hot spare disk is a standby disk that is not used for data storage unless a RAID member fails. If a disk failure occurs, the failed RAID member is replaced by the hot spare disk without user intervention. This improves data availability, since the RAID is able to tolerate more disk failures with a hot spare disk.

RAID Combinations

RAID levels may be combined in the following hierarchies:

- RAID 0+1 is a RAID 1 consisting of RAID 0 members
- RAID 30 is a RAID 0 consisting of RAID 3 members
- RAID 50 is a RAID 0 consisting of RAID 5 members

Summary of RAID Levels

The following table summarizes the performance characteristics of each RAID level. A high availability or access rate number indicates high availability or quick access rate.

Array Group	Availability	Access Rate	Capacity Utilization	Description
JBOD	1	1	100%	Data is distributed by filling each disk in turn.
RAID 0	1	5	100%	Data is divided into pieces and written to all disks in parallel.
RAID 1	5	2	50%	Data is duplicated on both disks.
RAID 3	3	3	Between 67% for 3 disks to 94% for 16 disks	Data is divided into pieces; the parity of these pieces is calculated; and the pieces are written to separate disks in parallel with the writing of the parity to a dedicated disk.
RAID 5	3	3.5	Between 67% for 3 disks to 94% for 16 disks	Data is divided into pieces; the parity of these pieces is calculated; and the pieces and parity are written to separate disks in parallel. The parity is written to a different disk each time.
RAID 0+1	4.5	5	50%	RAID 0+1 is a RAID 1 consisting of RAID 0 members.
RAID 30	4	4	Between 67% for 6 disks to 88% for 16 disks	RAID 30 is a RAID 0 consisting of RAID 3 members.
RAID 50	4	4.5	Between 67% for 6 disks to 88% for 16 disks	RAID 50 is a RAID 0 consisting of RAID 5 members.
NRAID	1	1	100%	Sum of all disks in the array.

System Requirements

Ensure that the following requirements are met before installing the disk array system.

Operating Environment

- 15 cm (6 inches) of space around the disk array system for proper ventilation
- ambient temperature of 5°C to 40°C (40°F to 104°F)
- ambient non-condensing relative humidity of 10% to 85%
- dust, smoke, and oil free environment
- no large magnetic fields, such as those generated by a high voltage power cables and motors, etc.
- no direct sunlight
- a flat, stable surface capable of supporting the disk array system

VT100 Terminal Settings

Refer to the following table for a summary of VT100 terminal settings required to communicate with the disk array system. Refer to your system manual for instructions on setting up the VT100 terminal settings.

Item	Required Setting
Connection	Serial Port (COM1 or COM2)
Protocol	RS232 (Asynchronous)
Cabling	Null Modem cable
Baud Rate	115, 200
Data Bits	8
Stop Bit	1
Parity	None

Host Interface

The disk array system has either dual SCSI interfaces or dual fibre channel interfaces. Refer to the following sections to understand host interface system requirements.

Small Computer Systems Interface

The easyRAID S8-U4R2 has dual Ultra320 SCSI interfaces that are compatible with previous SCSI standards. Refer to the following table to understand SCSI bus requirements.

Note

Subtract the internal cable length (60 cm) from the maximum SCSI bus length to calculate the maximum external SCSI cable length.

SCSI Standard	Maximum SCSI Bus Length in Meters	Data Rate in Megabytes per Second	Maximum Number of Devices
Ultra320	12	320	15
Ultra160	12	160	15
Ultra2	12	80	15
Ultra Wide	1.5	40	7
Fast Wide	3	20	15
Ultra	1.5	20	7

Fibre Channel Interface

The easyRAID S8-F2R2 has dual 2 Gbit fibre channel interfaces with SFP connectors for linkage to a fibre channel switch or host computer interface card. With the correct SFP transceiver and optical cable, the following transmission distances can be achieved.

Component	Optical	
SFP Transceiver	LC Optical	
Cable	Short Wave	Long Wave
Maximum Cable Length	50m	10 Km

Hard Disks

Supply the number of serial ATA disks needed for your application. Refer to “Understanding RAID” on page 2 to determine the number of disks needed.

2 Basic Configuration

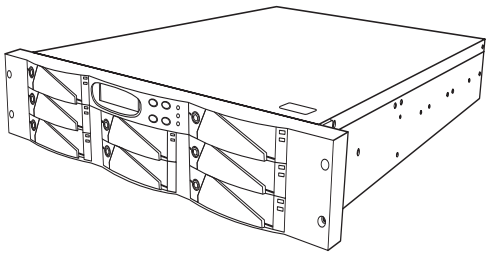
This chapter describes disk array system connections and disk installation.

Unpacking

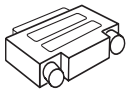
Contact your supplier if any of the following items are missing or damaged.

Caution

The disk array system is heavy. Be careful when lifting and moving it.

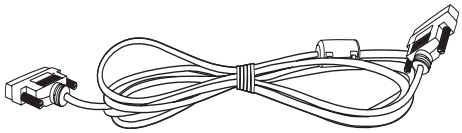


Disk Array System

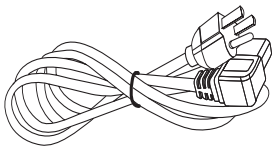


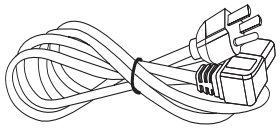
Active Terminator (easyRAID S8-U4R2 Only)

Front Panel Keys

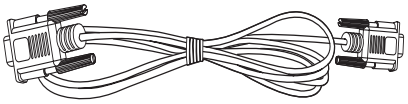


Ultra320 SCSI Cable (easyRAID S8-U4R2 Only)





Power Cables

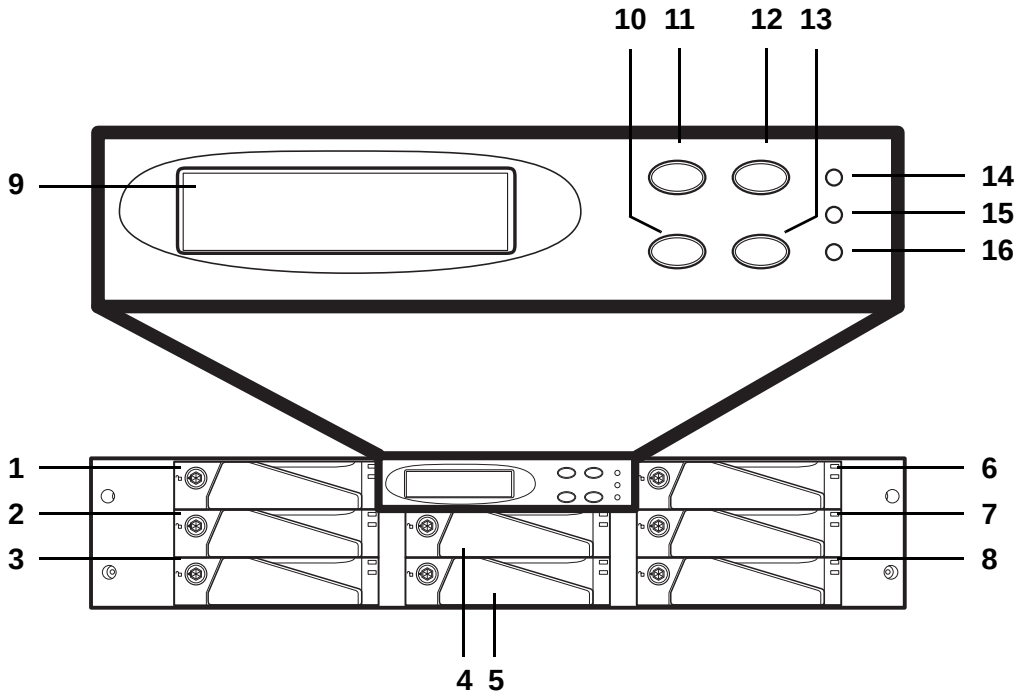


RS-232 Cable

User Manual

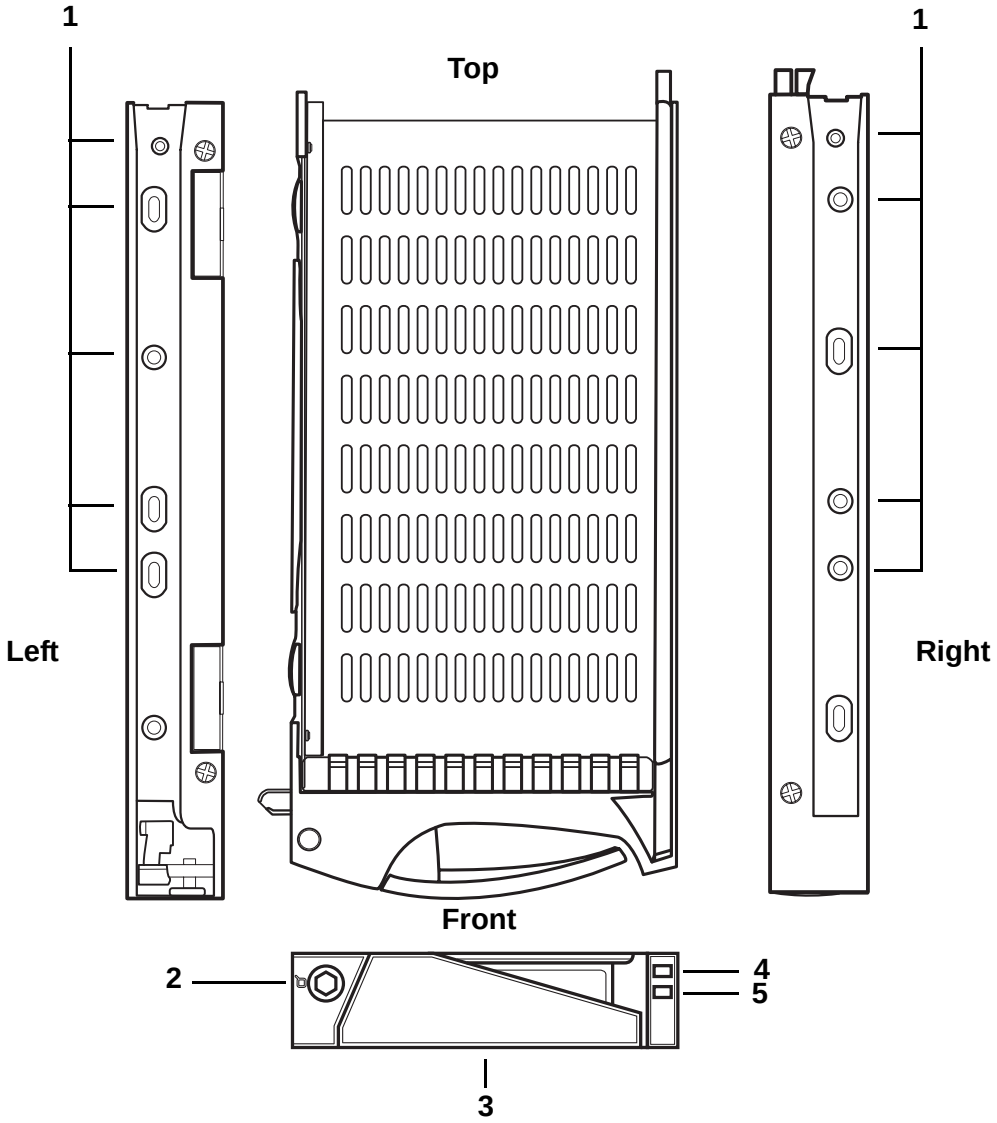
Components

Front View



No.	Name	Description
1-8	Disk trays 1 to 8	Removable hot swap disk trays.
9	LCD panel	Displays warning, operating, and configuration information.
10	Down function button	Moves down in the LCD menus.
11	Up function button	Moves up in the LCD menus.
12	Escape function button	Returns to the previous LCD menu without making changes.
13	Enter function button	Selects a menu item or confirms a choice or entry.
14	Power-on indicator (green)	Indicates the disk array system power is on.
15	Power supply fail indicator (red)	Indicates a failed power supply.
16	Host computer access indicator	Indicates data transfer between the disk array system and the host computer.

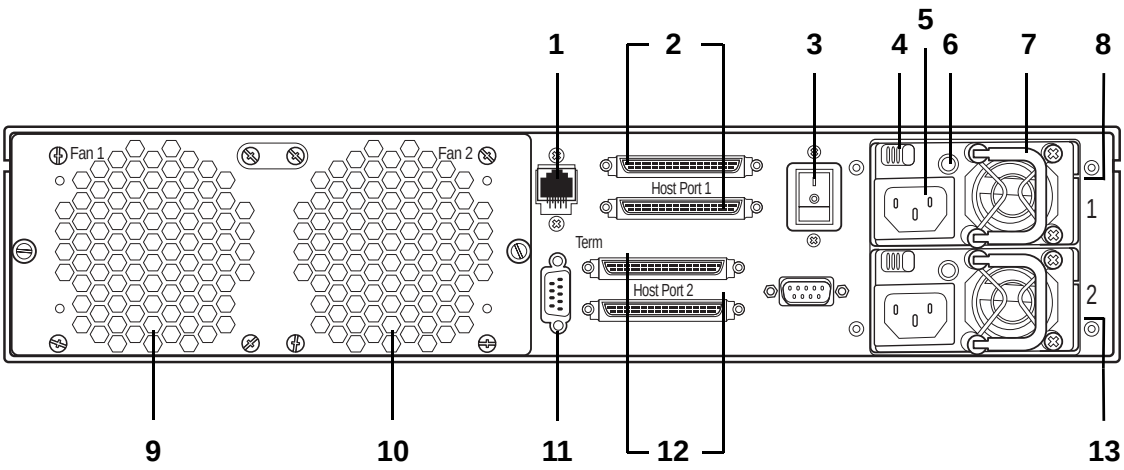
Disk Tray



No.	Name	Description
1	Disk mounting holes	Allows the disk be mounted on the disk tray with the screws included with the disk.
2	Tray lock	Prevents unauthorized removal of a disk tray. Opened with the included disk tray lock key.
3	Tray handle	Releases the disk tray.
4	Power/Error indicator LED	Indicates normal operation of the disk when green, or an error or failure of the disk when red.
5	Access indicator LED	Indicates that the disk is being accessed.

Rear View

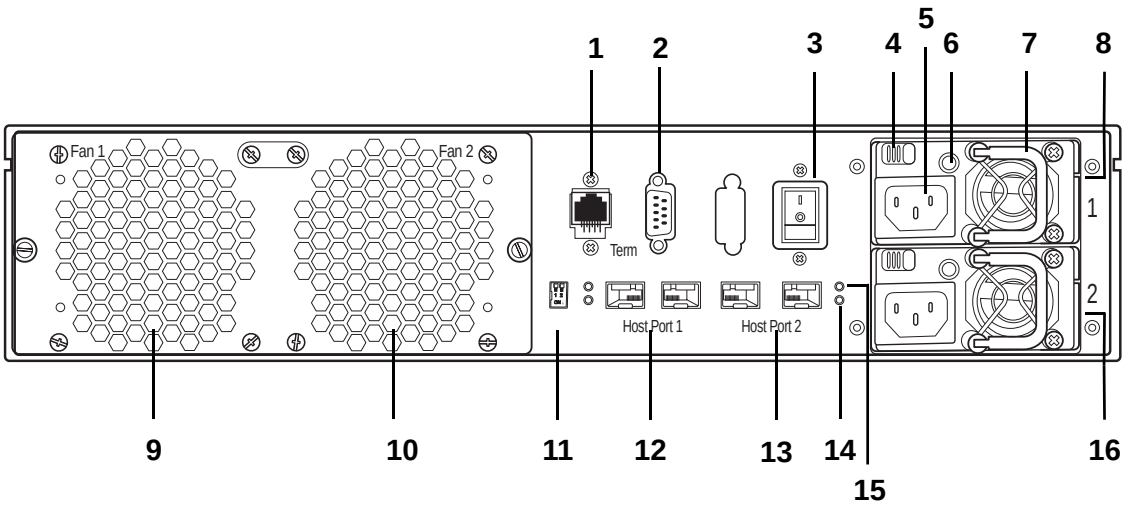
easyRAID S8-U4R2



No.	Name	Description
1	Ethernet Port	Used for browser-based configuration.
2	Host Port 1 (Primary SCSI channel)	Connects to the host server.
3	Main Power Switch	Turns the main power on or off.
4	Hot Swap Power Supply Release	Allows the power supplies to be removed.
5	AC Power In	Connects to an AC power source.
6	Power Supply On Indicator	Indicates normal operation of the power supply when green, or standby when red.
7	Power Supply Handle	Allows the power supply to be pulled out.
8	Power Supply 1	Removable redundant power supply 1.
9	Fan 1	Fan 1
10	Fan 2	Fan 2
11	RS-232 Port	Connects to a VT100 terminal or equivalent.
12	Host Port 2 (Secondary SCSI channel)	Connects to the host server.
13	Power Supply 2	Removable redundant power supply 2.

easyRAID S8-F2R2

The number of host ports on the disk array system has been doubled, and daisy chaining is possible with fibre channel models. The new rear view of 2U models is shown in this addendum.

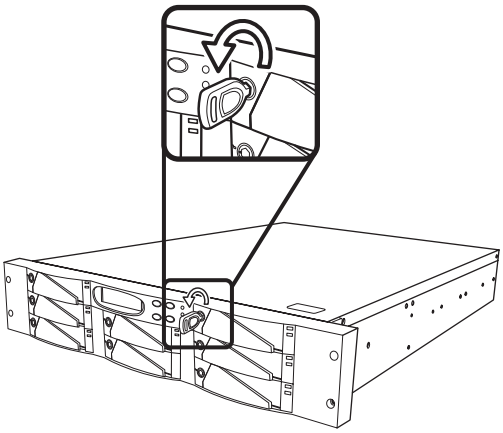


No.	Name	Description
1	Ethernet Port	Used for browser-based configuration.
2	RS-232 Port	Connect to a VT100 terminal or equivalent.
3	Main Power Switch	Turns the main power on or off.
4	Hot Swap Power Supply Release	Allows the power supplies to be removed.
5	AC Power In	Connects to an AC power source.
6	Power Supply On Indicator	Indicates normal operation of the power supply when green, or standby when red.
7	Power Supply Handle	Allows the power supply to be pulled out.
8	Power Supply 1	Removable redundant power supply 1.
9	Fan 1	Fan 1
10	Fan 2	Fan 2
11	Host Port Speed Switch	Switch 1 controls host port 1 speed. Switch 2 controls host port 2 speed. Switch up for 2Gb/s or down for 1Gb/s.
12	Host Port 1 (Primary Fibre channel)	Connects to the host server.
13	Host Port 2 (Secondary Fibre channel)	Connects to the host server.
14	Access LED	Indicate FC signal is accessing.
15	Link LED	Indicate FC connection is good.
16	Power Supply 2	Removable redundant power supply 2.

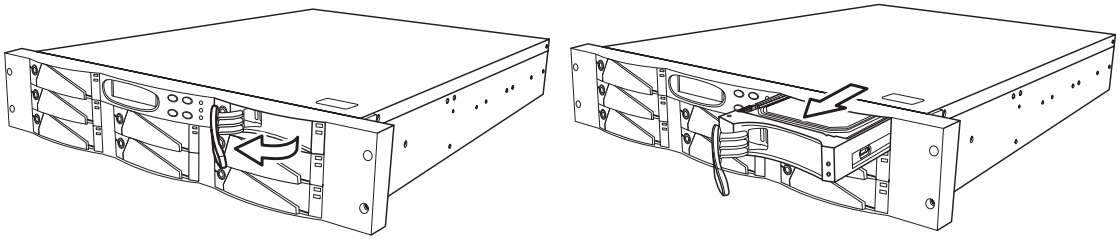
Installing Disks

This section describes how to install disks in the disk array system. Read “Understanding RAID” on page 2 to decide how many disks are required.

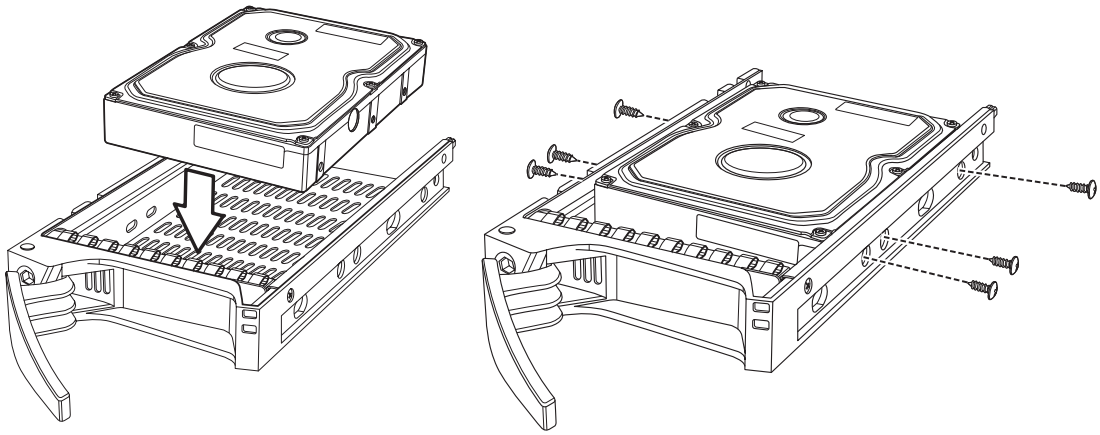
1 Unlock the disk tray with an included disk tray key.



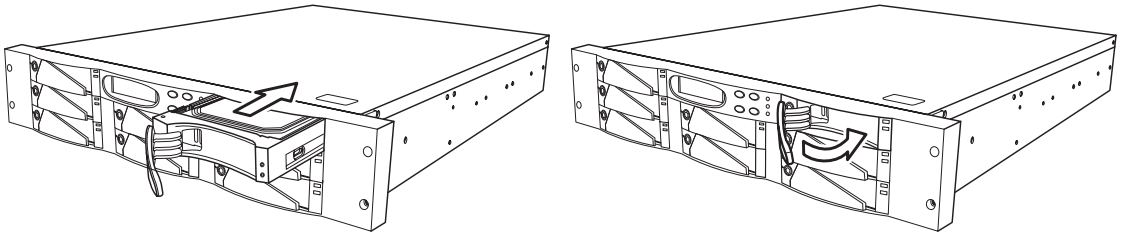
2 Pull the disk tray handle to the opened position, then remove the disk tray.



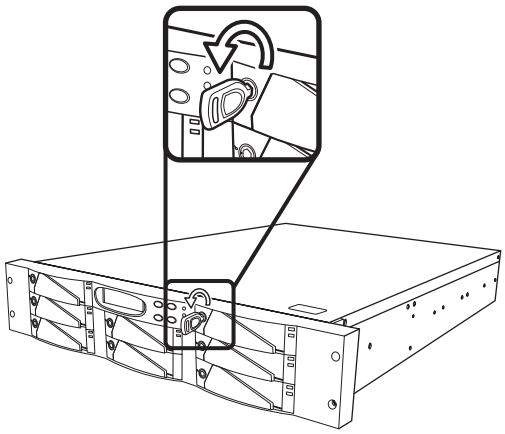
3 Insert the disk into the disk tray, align the back of the disk with the back of the disk tray, then attach the disk to the disk tray with the screws supplied by the disk supplier.



4 Slide the disk tray back into the empty slot, then push the disk tray handle closed.



5 Lock the disk tray with the key.



6 Repeat these steps until all of the required disks have been installed.

Making Connections

After the required number of disks have been installed, external connections to the disk array system must be made. This section describes how to make all of the necessary connections.

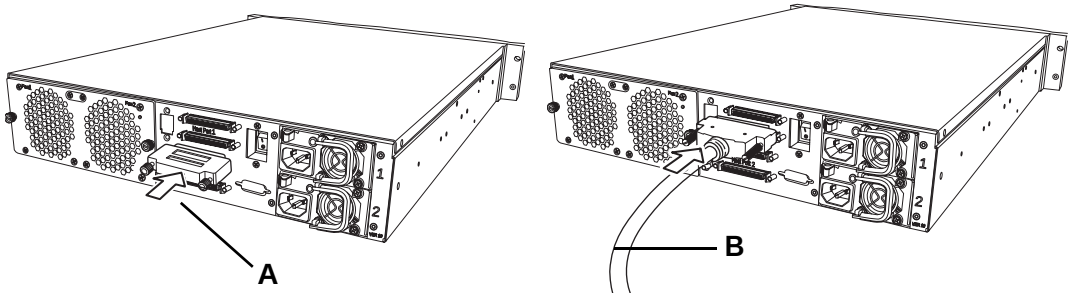
Connecting the Host Interface

The disk array system has either dual SCSI interfaces or dual fibre channel interfaces. Refer to the following sections to make host interface connections.

Small Computer Systems Interface

The easyRAID S8-U4R2 has dual Ultra320 SCSI interfaces. Follow these instructions to make connections.

1. Connect the active SCSI terminator (A) to the bottom connector of the easyRAID S8-U4R2 host port 1 (primary SCSI channel) at the rear of the disk array system.

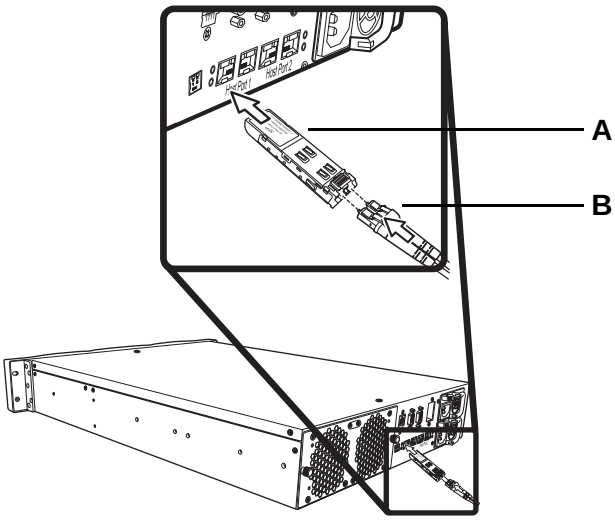


2. Connect the Ultra 320 SCSI cable (B) to the top connector of the easyRAID S8-U4R2 host port 1 (primary SCSI channel) at the rear of the disk array system.

Fibre Channel Interface

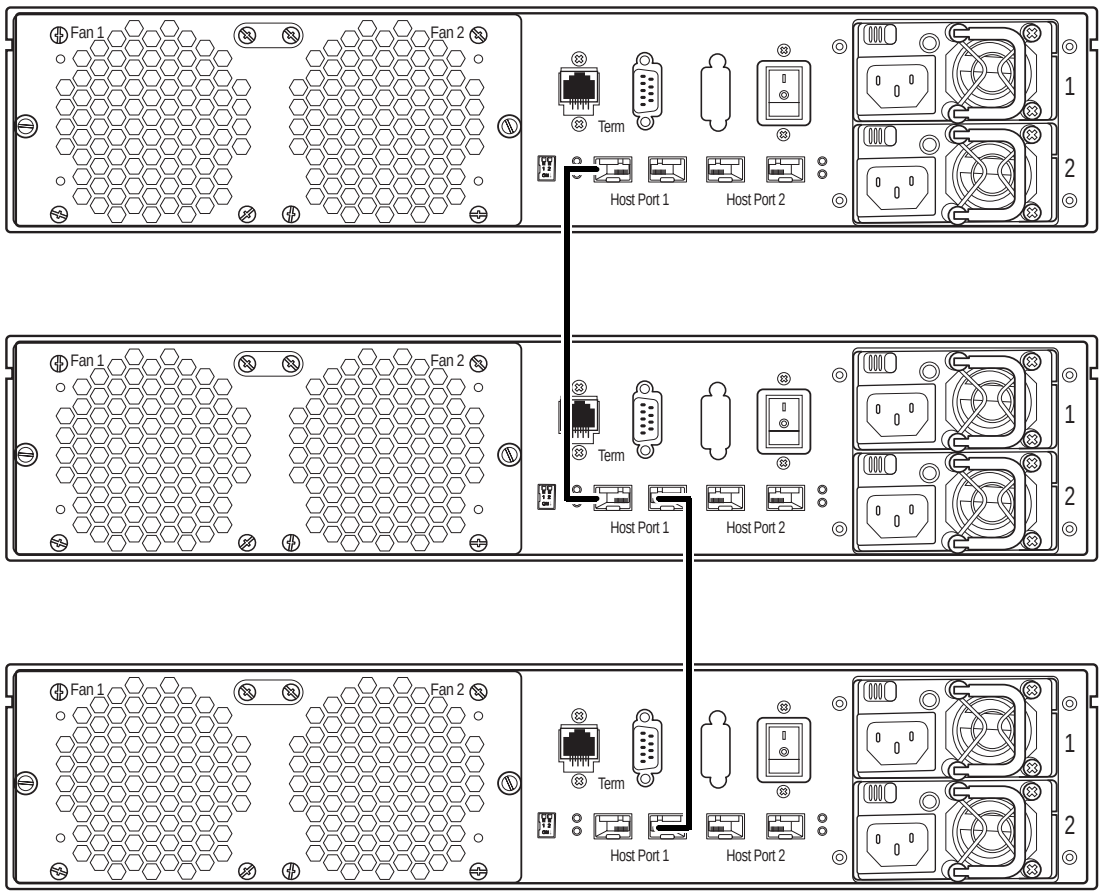
The easyRAID S8-F2R2 has dual 2Gb fibre channel interfaces. Each interface can be used with optical or copper transceivers and cables. Follow these instructions to make optical connections.

1. Insert the LC Optical SFP transceiver (A) in to the easyRAID S8-F2R2 host port 1 (primary fibre channel) at the rear of the disk array system.
2. Connect the optical cable (B) to the LC Optical SFP transceiver (A).



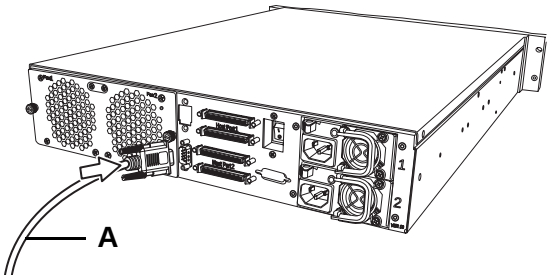
Fibre Channel Daisy Chaining

A fibre channel switch was needed to connect previous 2-port models. New 4-port models can be daisy chained, so that a switch is not needed.



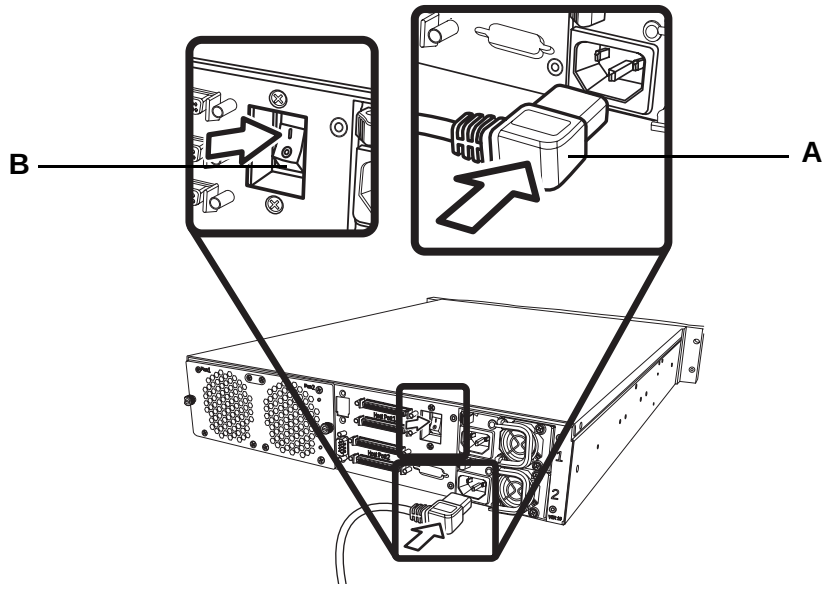
Connecting the RS-232 Cable

Connect the supplied RS-232 cable (A) to the RS-232 port at the rear of the unit.



Connecting and Turning on the Power

1 Connect a power cable (A) to a power supply connector at the rear of the unit. The power supply on indicator LED glows red.



2 Connect the second power cable to the remaining power supply connector at the rear of the unit. The power supply on indicator LED glows red when the power supply is connected.

Note

The system is equipped with auto switching power supplies that can run on 100 to 240 VAC.

3 Press the disk array system main power switch (B) to the ON position. All power supply on indicator LEDs glow green and the disk array system automatically begins the self-test sequence.

3 Maintenance

Replacing a Disk

A disk failure is indicated when the Power/Error LED at the front of the drive tray turns red and the audible alert sounds.

Note

Turn off the audible alert by pressing the Up ↑ and Down ↓ function buttons on the front panel twice simultaneously.

The LCD panel displays the failure with the symbol “R” or “W”. “R” indicates a disk failure or error, and “W” indicates that there are too many bad sectors on the disk.

Example:

- Disks 1 to 2 are members of RAID group 1.
- Disks 3 to 6 are members of RAID group 2.
- Disk 7 has too many bad sectors.
- Disk 8 has an error or a fault.

Disks are hot swappable, which means that they can be inserted and removed while the disk array system is powered on and operating. Follow these instructions to replace a failed disk.

1. Unlock the disk tray with an included disk tray key.
2. Gently pull the disk tray handle to the opened position.
3. Remove the screws from the failed disk, then remove the disk from the disk tray.
4. Align the rear of the new disk with the rear of the disk tray.
5. Insert the new disk into the disk tray.

Note

The new disk must have the same or a greater capacity than the faulty disk that was removed. If the disk capacity is smaller, the audible alert sounds and the auto-rebuild operation doesn’t start. For best performance, it is recommended that the new disk be identical to the failed disk.

6. Attach the disk to the disk tray with the screws that came with the disk.
7. Slide the disk tray back into the empty slot, then close the disk tray handle.
8. Lock the disk tray with the key.

Replacing a Power Supply

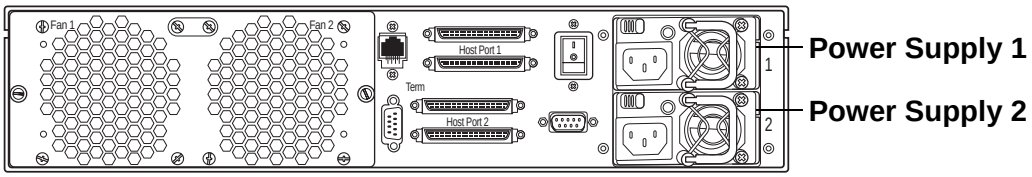
The disk array system is equipped with a Power Supply Fail Indicator LED at the front of the unit that turns red when one of the power supplies fails. The message “Power x failure” also appears on the LCD panel, where x refers to power supply 1, or 2, and an audible alert sounds.

Note

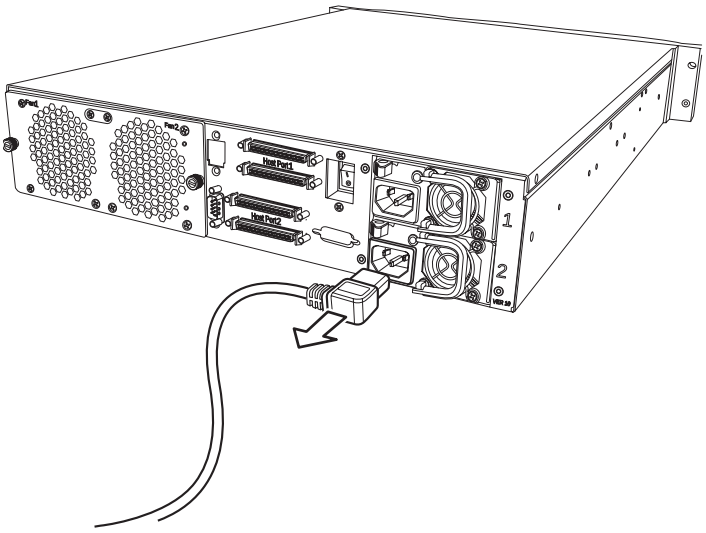
Turn off the audible alert by pressing the Up ↑ and Down ↓ function buttons on the front panel twice simultaneously.

Power supplies are hot swappable, which means that they can be inserted and removed while the disk array is powered on and operating. Follow these instructions to replace a failed power supply.

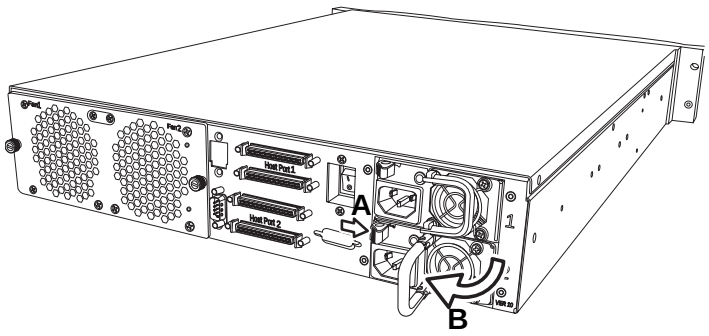
1 Identify the power supply that has failed. The Power supply on indicator LED glows red on the power supply that has failed.



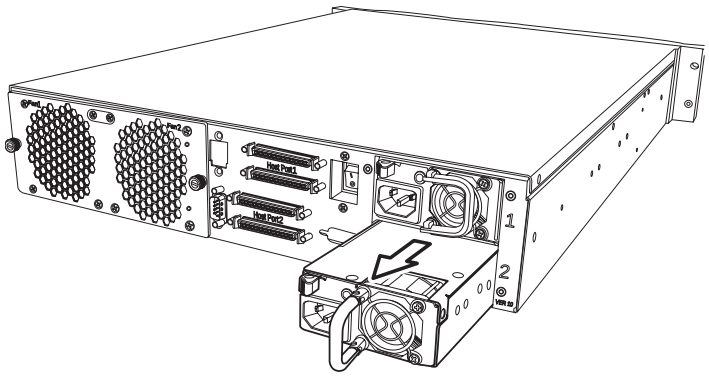
2 Unplug the power cable connected to the failed power supply unit.



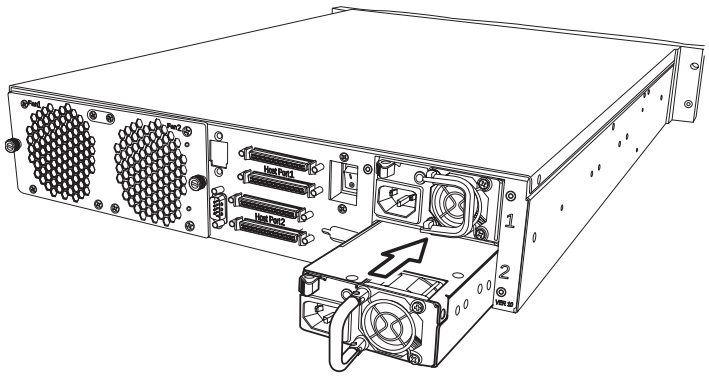
3 Push the power supply release switch (A) in the direction illustrated and pull the power supply handle out (B) at the same time.



4 Remove the power supply unit.



5 Insert a new power supply unit in the empty power supply unit slot. The power supply automatically locks into position when fully inserted.

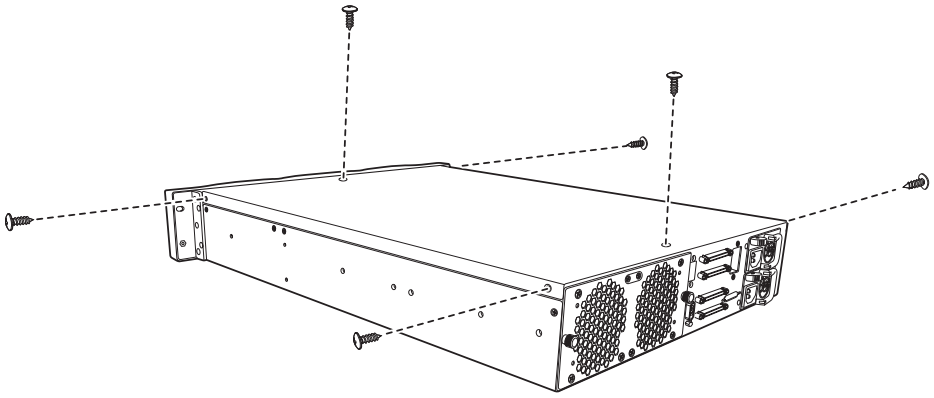


6 Reconnect the power cable. The Power supply on indicator LED glows green on the power supply that has just been replaced.

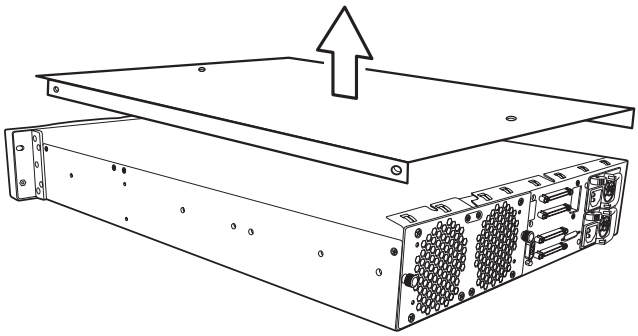
Upgrading Memory

The disk array system takes a single 200 pin PC200 DDR SDRAM SO-DIMM with a maximum capacity of 1 GB. Follow these instructions to upgrade the memory.

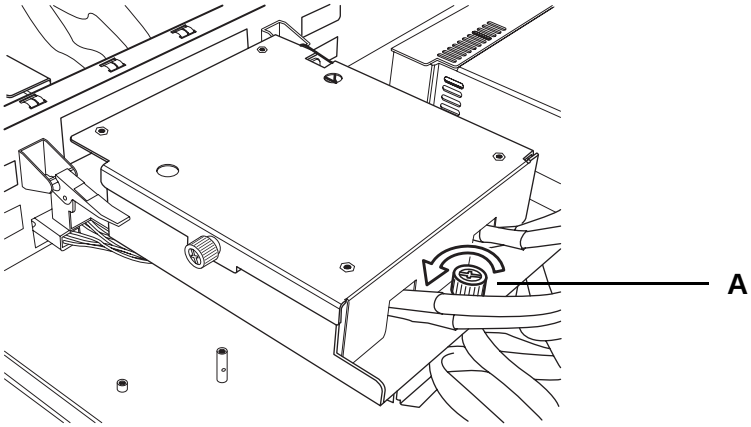
1 Remove the six screws from the disk array system top cover as illustrated.



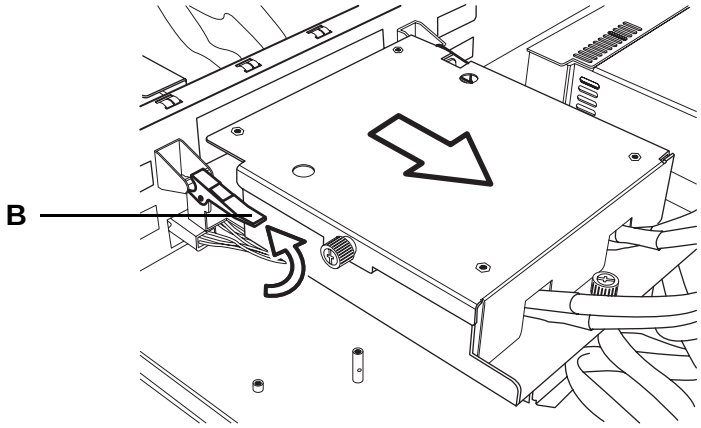
2 Lift the cover.



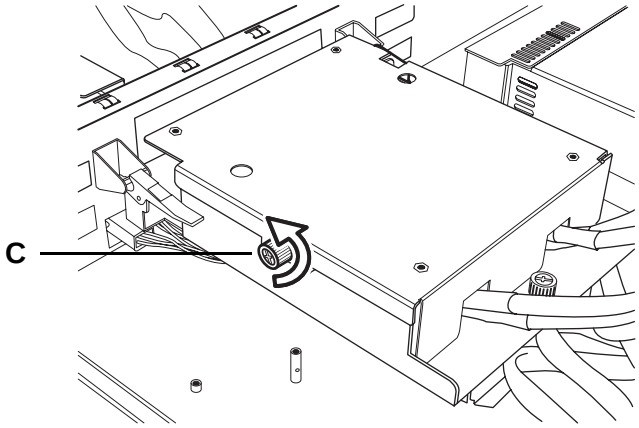
3 Unscrew the controller cage thumbscrew that is at the rear (A).



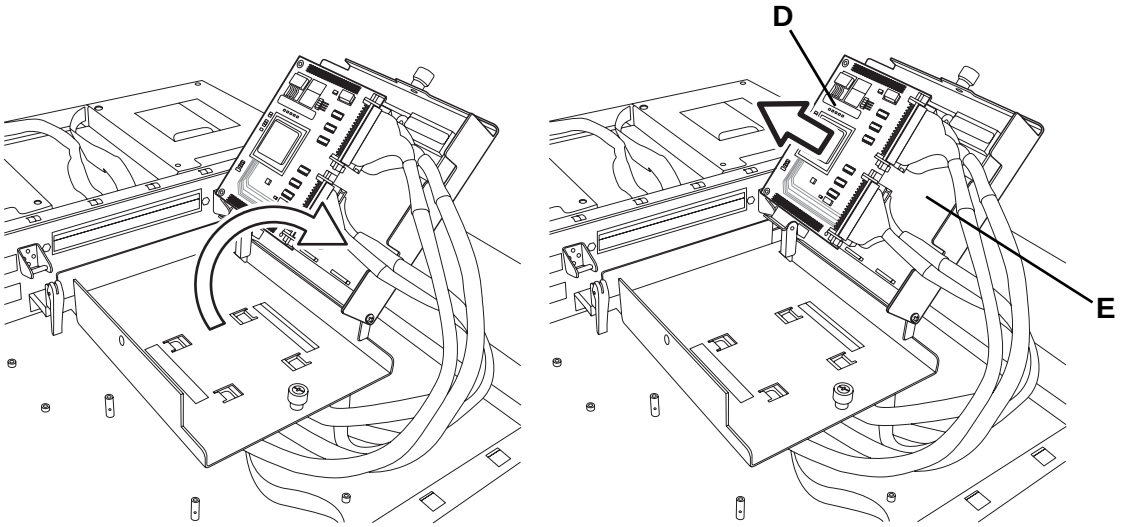
4 Lift the controller cage lever (B) to release the controller cage from the backplane.



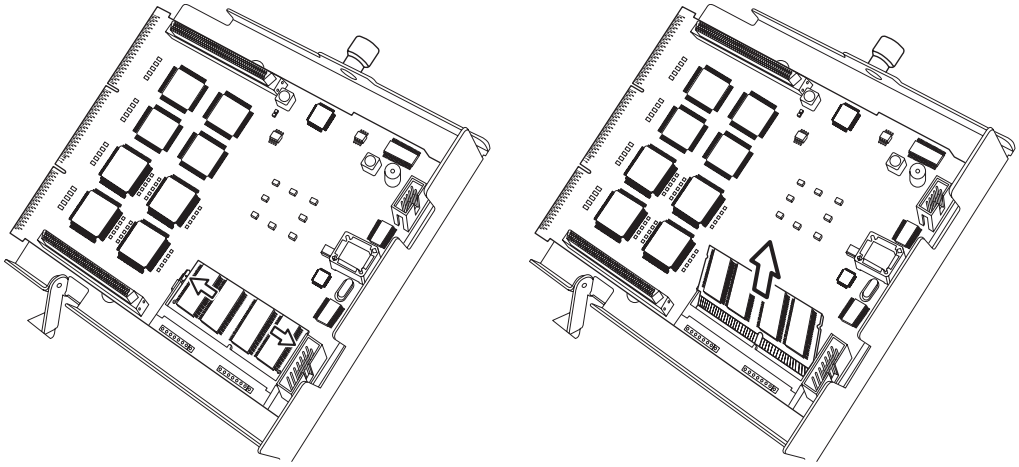
5 Unscrew the controller cage thumbscrew that is at the side (C).



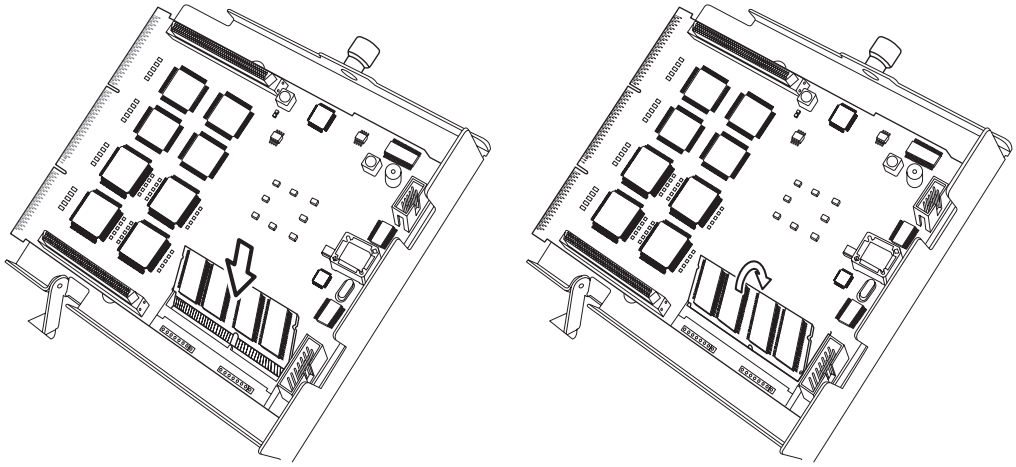
6 Open the controller cage, then carefully lift the daughterboard (D) from the disk group controller (E).



7 Pull the DIMM retaining clips away from the DIMM, then remove the DIMM. The DIMM springs out of the socket.



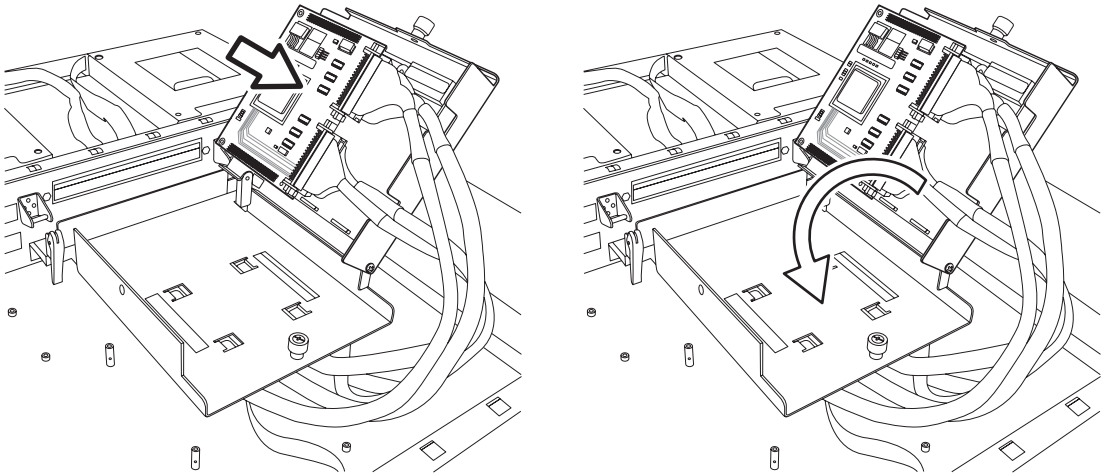
8 Gently push the new DIMM into the socket at 45 degrees, then push the corners of the DIMM down. The DIMM is secured by the DIMM socket retaining clips.



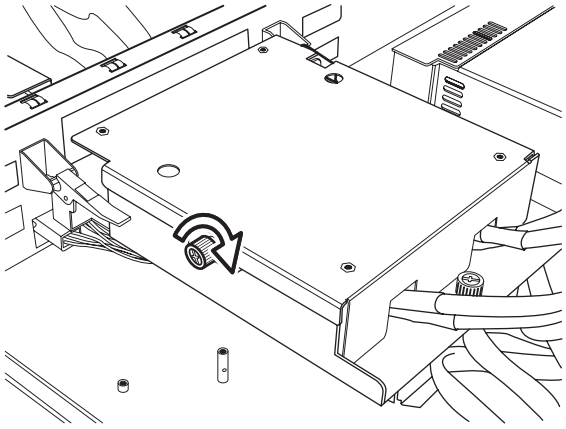
Note

The DIMM module will fit in only one direction. Do not force the DIMM into place.

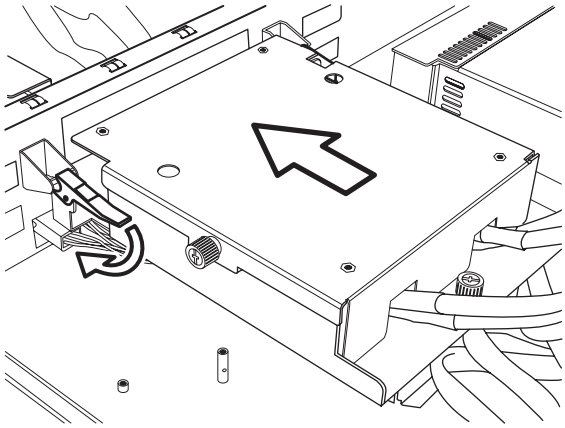
9 Replace the daughterboard on the disk group controller, taking care to align the connectors, then close the controller cage.



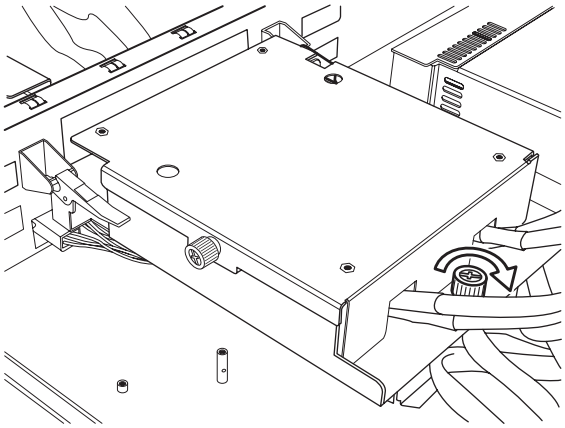
10 Tighten the controller cage thumbscrew that is at the side.



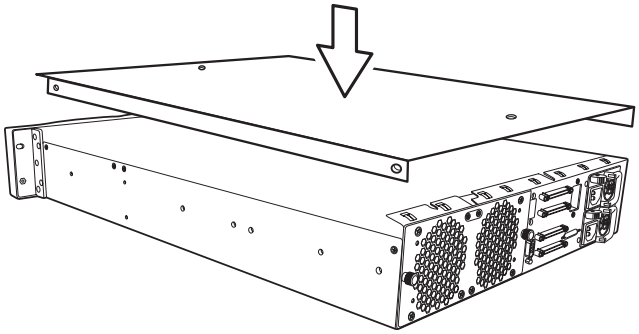
11 Lower the controller cage lever to insert the controller cage into the backplane.



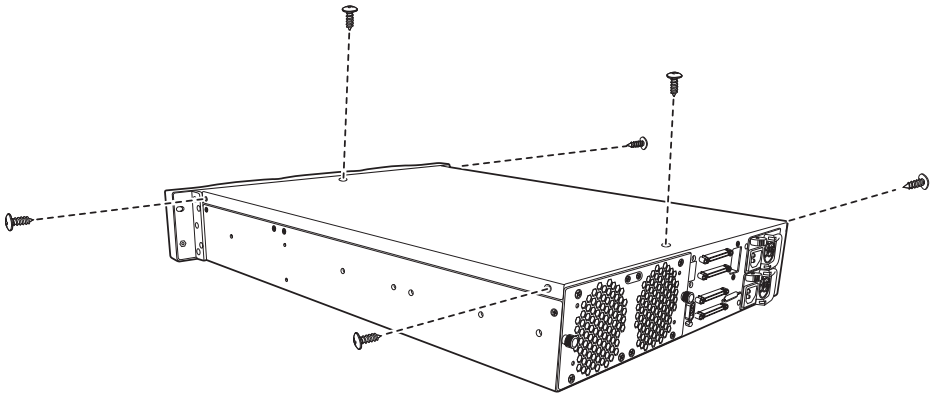
12 Tighten the controller cage thumbscrew that is at the rear.



13 Place the top cover on the disk array system.



14 Replace the six screws to fix the top cover on the disk array system chassis.



Replacing a Fan

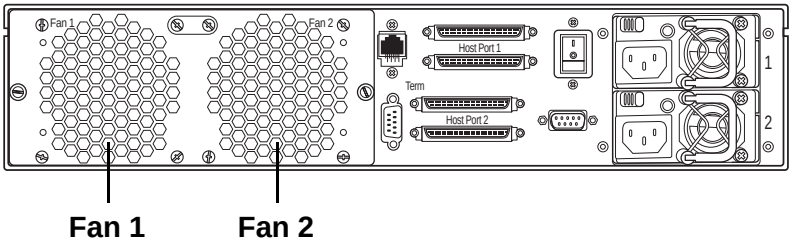
A fan failure is indicated by the LCD panel message “Fan x failure”, where x refers to Fan 1 or Fan 2. An audible alert also sounds.

Note

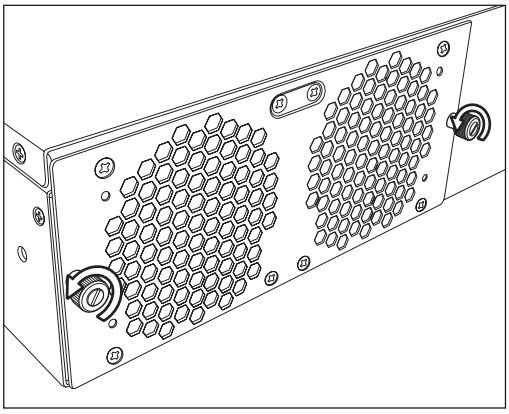
Turn off the audible alert by pressing the Up ↑ and Down ↓ function buttons on the front panel twice simultaneously.

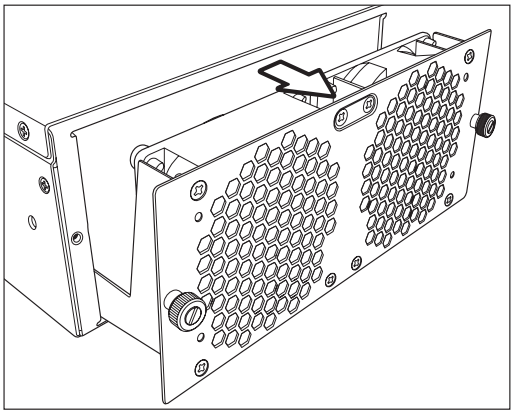
Follow these instructions to replace a failed fan.

1 Identify the fan that has failed.



2 Loosen the fan enclosure thumbscrews, then pull the fan enclosure out of the chassis.

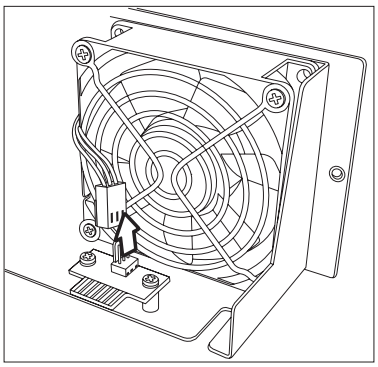


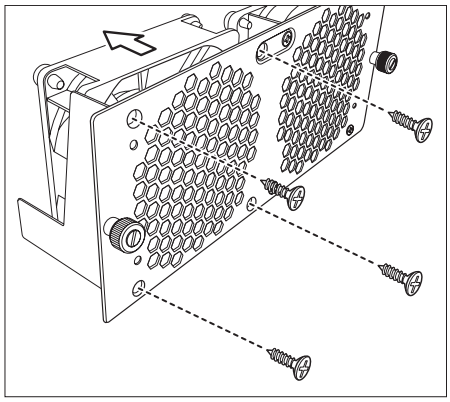


Caution

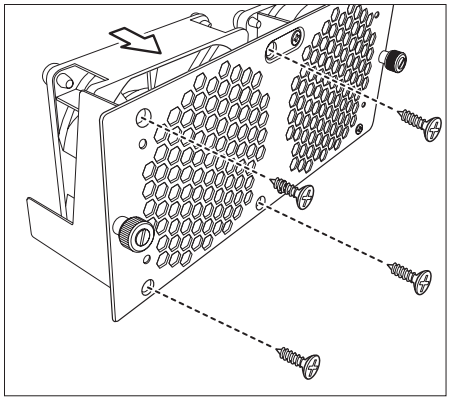
High speed rotating fan blades can cause injury. Wait until both fans have stopped completely before removing either of them.

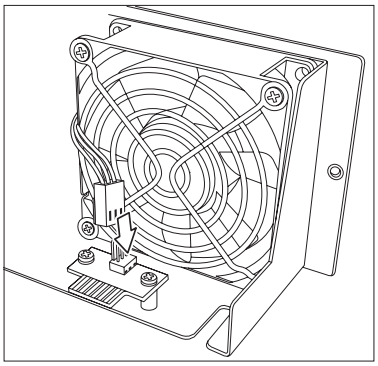
3 Unplug the power connector, remove the screws, then remove the failed fan.





4 Secure the new fan with the screws removed in the previous step, then insert the power connector.

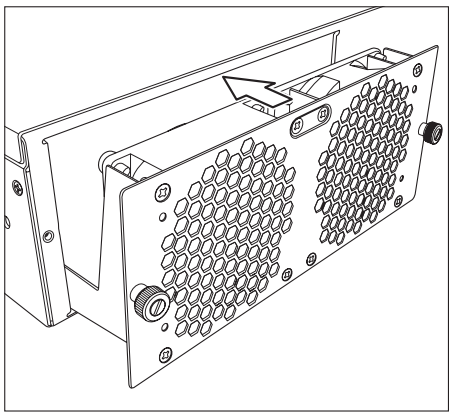


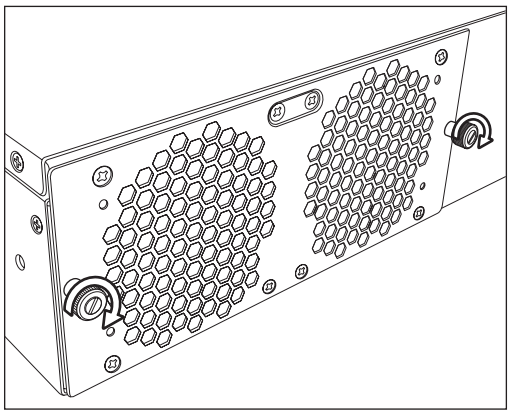


Caution

The fan will begin rotating immediately after it is plugged in. Keep your fingers away from the blades.

5 Insert the fan enclosure into the chassis, then tighten the fan enclosure thumbscrews.





Appendix

Hardware Specifications

Item	Specification
Host Interface	SCSI Ultra320 (easyRAID S8-U4R2) or Fibre Channel (easyRAID S8-F2R2)
Disk Interface	8 x SATA, 150 MB/s
Dimensions	88 mm (H) x 483 mm (W) x 583 mm (D)
RAID Functions	• Raid levels: JBOD, NRAID , 0, 1, 0+1, 3, 5, 30 or 50 • Hot spare support • Disk hot swapping with automatic online rebuilding • Multiple RAID (max. 8) • Each RAID can be divided into up to 16 slices • Each host channel can have 128 LUNs • Disk scrubbing • RAID level migration • S.M.A.R.T.
Disk Array Functions	• O/S independent and transparent • Maximum fault tolerant capacity 2 TB • 64 MB ~ 1 GB DDR SDRAM • LCD panel operation indicator • Audible alarm/disable alarm • Optional battery backup for disk array status • LED indicator on disk failures • Real-time clock
Connectors	• 4 x SCSI Ultra320 ports (easyRAID S8-U4R2) • 4 x 2 Gbit FC ports (easyRAID S8-F2R2) • 1 x RS-232 Serial port (115200, n, 8, 1) • 1 x RJ-45 Ethernet port (10 Mbps)
Power Supply	• 300W (1+1) redundant • 90 - 264 VAC, 47-63 Hz, +/- 10% • Over voltage, current, power, and short circuit protection • LED indicates power status • Operating temperature: 0°C ~ 50°C • Operating humidity: 20 ~ 90% • Output: +5V, +3.3V, +12V
Warranty	3 year warranty
Safety	UL, CE and FCC Class B

Item	Specification	
Controller	CPU	Intel i80321 64-bit RISC microprocessor
	Disk Interface	Serial ATA I
	Disk Interface Chipset	Marvell MV88SX8050
	Memory Type	PC200 DDR 200-pin SO-DIMM
	Memory Sockets	1
	Memory Size	Up to 1 GB ECC
	LCD Interface	One LCD panel, 2 lines by 16 characters
	Button Interface	Up, Down, ESC, Enter and Reset
	Battery Backup Interface	Yes
	Daughter Board Interface	PCI-X 64-bit, 66/133MHz
	Backplane Interface	Compact-PCI
Backplane	Disk Channel Support	8 channels
	Disk Number Supported	8 disks
	Disk Connector Type	715PIN_87678-001
	Sequence Disk Power On	Select by jumper, (H/W: power on all disks, S/W: 4 disks at a time with 2 ms interval)
	Temperature Sensors	4
	Power Connector Type	2 x ATX
	Fan Connector Type	Winning Slot 2 x 6 Female Connectors 180

Cooling Fans

Temperature	Fan 1 rpm	Fan 2 rpm
Under 25°C	1000	1000
26°C ~ 40°C	1500	1500
41°C ~ 44°C	2100	2100
Over 45°C	3100	3100
Fan 1 Failure	< 600	3100
Fan 2 Failure	3100	< 600